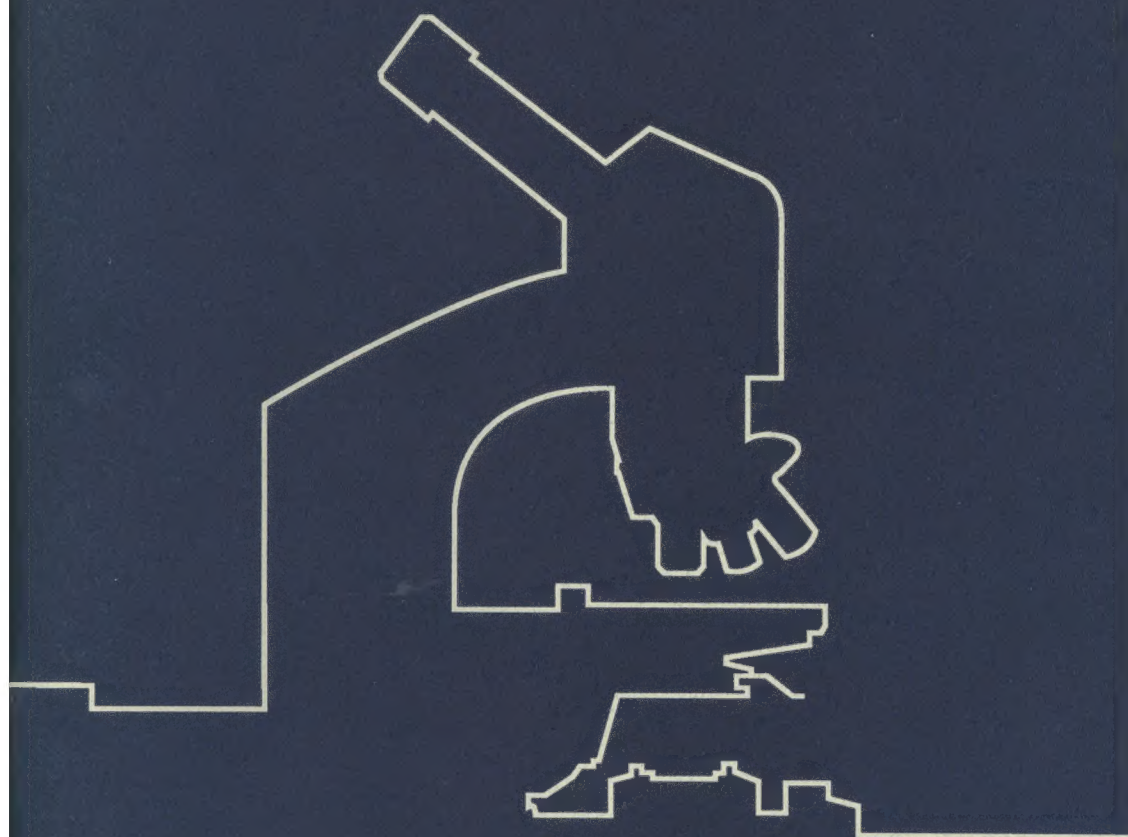
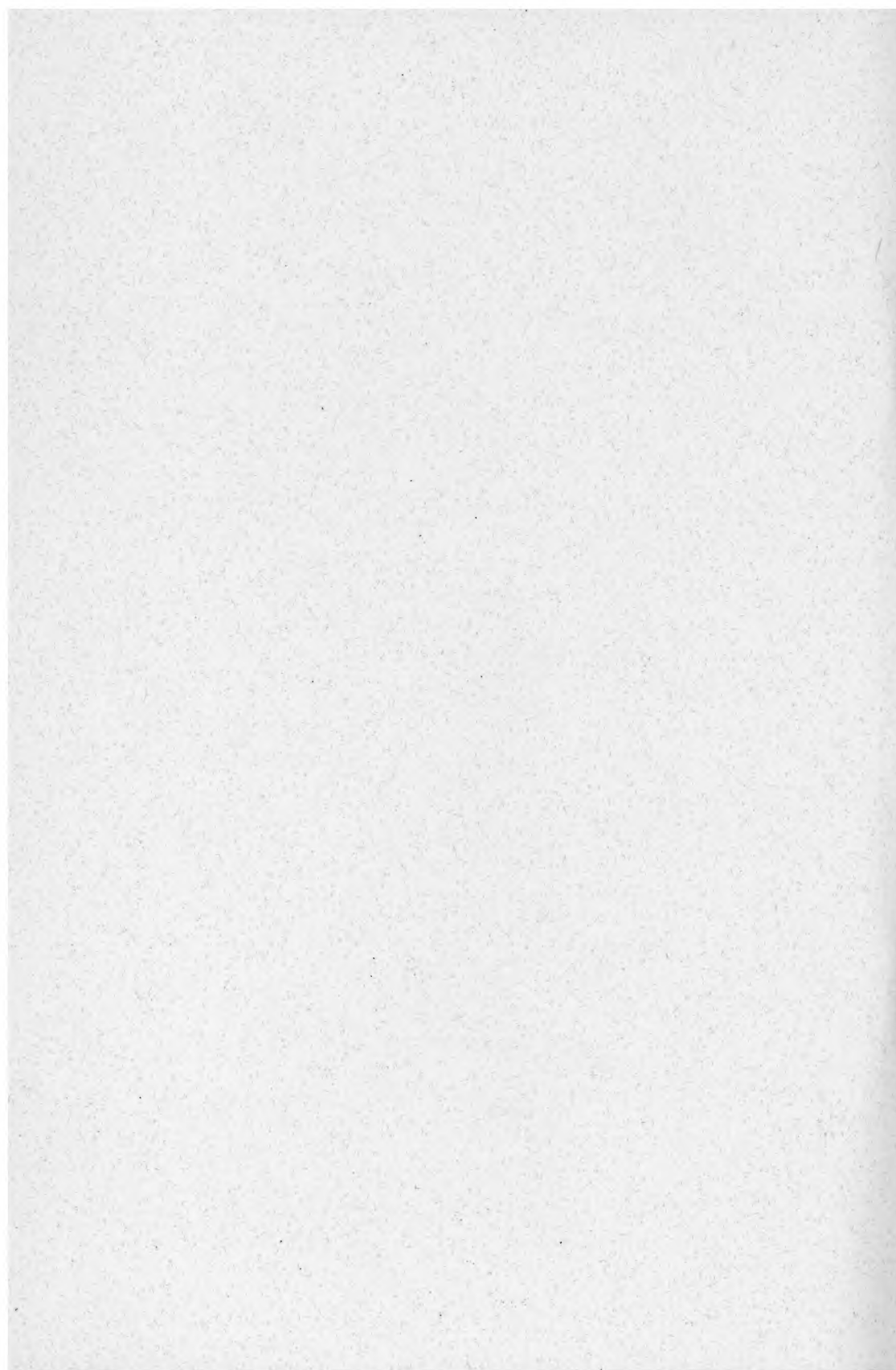


The Path to Paranchych

A HISTORY OF THE DEPARTMENT OF MICROBIOLOGY, UNIVERSITY OF ALBERTA



JAMES N. CAMPBELL



The Path to Paranchych

A retrospective and subjective view of the facts and foibles associated with the genesis and early development of the Department of Microbiology, University of Alberta.

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Acknowledgements

The major credit goes to my wife Lynne whose untiring support helped me retain whatever sense of proportion and perspective I had both while living through these events as well as when trying to recall them.

I would also like to thank my son Daniel and daughter-in-law Kitty Campbell for their support and editorial comments.

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Prelude

I have been asked to compile a “history” of our department. This seemingly simple request begs the complicated counter-question: “What sort of history would be the most appropriate?” The administrative events leading to the formation of the department and its programmes are essential to the story, but are not, in and of themselves, unique or of particular interest. I have included these data in tabular form in appendices at the end. A compilation and interpretation of the scientific contributions of departmental staff members and students would be an important document and one that should be eventually written, but such a document could in fact be prepared by anyone, within or without the department, with sufficient scientific knowledge to understand the publications and evaluate their impact. I do not envy my successor in this regard. To present the scientific achievements of this department as a coherent story and not just a reiteration of the bibliographies of individual staff members, will be a difficult task, because, in accordance with the stated policy of this department from its creation until well into the Westlake era, each staff member pursued his or her own independent and disparate interests with little or no movement toward developing coordinated research projects. In any case, since there are some significant scientific stories still unfolding in this department and perhaps for some personal reasons as well, I have decided that it would be premature to adopt this approach at this time.

I have chosen a more personal perspective. The creation of this department and its development to its present state involved many formal and a lot more behind-the-scenes struggles. The nature of these struggles was a reflection not only of the intellectual climate, but also of the unique personalities of the protagonists at the time. I

have been a member of this department from its inception. I have participated, one way or another, in most of its endeavours and I knew most of the people involved rather well. Perhaps this gives me some licence to attempt a description of the events leading up to the actual administrative decisions, and of even greater significance, of the people who were involved in those decisions.

As presently constituted, the Department of Microbiology offers a complete spectrum of undergraduate programmes leading to specialization and honours baccalaureate degrees, as well as graduate programmes leading to the M.Sc. and Ph.D. degrees. Our graduates have gone on to compete successfully in various fields of endeavour both within and without the discipline. The department actively supports research programmes by the staff members whose efforts have attracted significant levels of funding as well as international recognition. We are, in short, not only a fully formed and functioning academic unit whose influence and recognition both on-and off-campus continues to grow, but also one which is responsive to new developments and directions in the constantly maturing field of microbiology.

Things were not always thus. We did not appear in response to a desire on the part of this university to modernize its offerings to keep up with the torrent of new knowledge and perceptions that have occurred in biology during the last half century. The Faculty of Medicine supported our creation because they wanted to be rid of us, the Faculty of Science did not want us, and when we were foisted upon them, tried very hard to submerge our separate identity. We are where we are because of the efforts of some very dedicated people who fought long and hard to push through the idea of microbiology in the face of what was at best indifference, and at worst overt hostility from a seemingly endless number of

extra-departmental sources.

The unadorned dates and names I have gleaned from faculty and university files and are to the best of my knowledge accurate. For events prior to 1960, My chief sources of personal anecdotes prior to 1960 have been Tats Yamamoto and Art McKinnon. For events after 1960, I have relied heavily on my own faulty memory with a little help from my friends. Whatever the source, the responsibility for any errors of narration or interpretation is my own.

The story is an interesting one. Whether or not I can communicate that interest remains to be seen. To quote another writer of historical fiction:

“...we your humble patience pray, gently to hear, kindly to judge, our play.”⁽¹⁾

Development of Microbiology in the Faculty of Medicine

This department really began with the creation of the Faculty of Medicine on this campus. In 1912 President Henry Marshall Tory offered a site on campus for the building of a proposed new hospital with the stipulation that it would be available for the purpose of clinical teaching in medicine, if and when that was initiated at the University of Alberta. The following year the eighty-bed Strathcona Hospital was built on the site of the present U.A.H. parking lot at 112 St. at 85th Ave.

In autumn of 1913, the Faculty of Medicine was created as the fourth university faculty, after Arts and Science (1908), Law (1912) and Applied Science (1913). In September 1914, the first class of twenty-six medical students was enrolled with classes being held on the third floor of Pembina Hall. The faculty was administered by a Faculty of Medicine Council consisting of H.M. Tory as Chairman, one M.D., one chemist and one botanist. Students completed a three year pre-clinical program here which included the following courses:

First year:

elementary bacteriology, physics, inorganic chemistry, botany, zoology, French, German

Second year:

organic chemistry, biochemistry

Third year:

bacteriology, pathology, etc.

It is noteworthy that even in those early days, they were aware

that for a truly balanced education, students should get at least twice as much bacteriology as biochemistry.

After three years, successful students transferred to McGill, University of Toronto or University of Manitoba, in descending order of popularity, to complete the clinical and residence requirements for the degree of M.D., which was conferred by the appropriate latter institution.

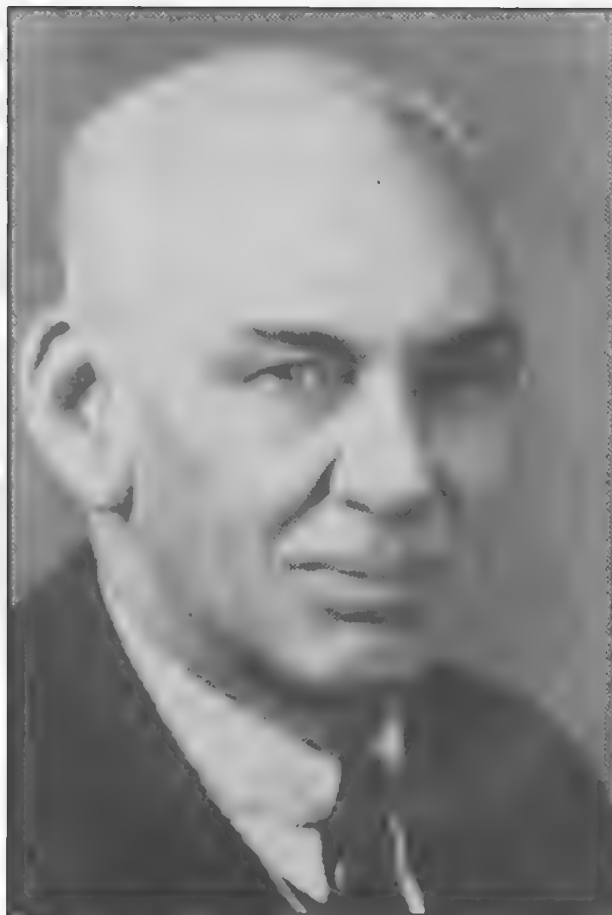
The first professor of bacteriology was Allan C. Rankin M.D.(McGill), a native of Montreal, who shortly after left to serve in the Canadian army during World War I from (1914 to 1918). Upon his return in 1919, he was appointed the first Dean of Medicine. Dr. Rankin had a very distinguished career and even as an administrator maintained an active interest in communicable diseases and epidemiology as well as his ties with the military. At the outbreak of World War II, he was appointed Director of Hygiene Services for the Canadian Military Forces. He died in 1954.

In 1920, the Rockefeller Foundation of the U.S. gave \$100,000,000 for the upgrading of North American medical education, of which \$5,000,000 was for use in Canada. U.of A.'s share of this largesse was \$500,000 which, upon investment, provided an annual income of \$25,000 which permitted the university to hire the additional teaching staff necessary to consider taking on the clinical as well as the basic science components of the medical curriculum.

To this end, in 1921 Robert M. Shaw, B.A. (Dalhousie), M.D. (McGill) was hired as Assistant Professor of Bacteriology and Hygiene. He was appointed Professor of Bacteriology in 1931, a post he held until his retirement in 1949. His research interests

were in the field of immunology, more specifically the haematology of, and potential vaccine development for, tularaemia, infectious mononucleosis and tuberculosis. Although he retired long before my arrival on the scene, I had the opportunity to meet him on several occasions. He is fondly remembered by those who knew him well as a kind and considerate gentleman of distinguished appearance and almost courtly manners. He maintained a genuine interest in this department and its struggles for survival and donated some of his books to our beginning collection. During one of the recurring purges of obsolescence, which periodically sweep our departmental reading room with the goal of creating more shelf space, I rescued one of his gifts from the shredder. It is a copy of the 3rd (1946) edition of the "Textbook of Bacteriology and Immunology" by Topley and Wilson. This two-volume work was for many years the benchmark of bacteriology texts and these well-thumbed volumes represent a gift of what must have been one of his valued possessions. They now reside in my office and make interesting reading for anyone who wishes to know how the microbiological world thought at that time. Dr. Shaw was over ninety years of age when he died in 1974.

In 1922 the Faculty of Medicine formally established its complete M.D. program consisting of one pre-medical year, two years of basic medical sciences, two years of clinical instruction and one year hospital internship. At that time, the Department of Bacteriology and Hygiene employed two full time and two part-time teachers while the Department of Biochemistry got by with only two full-time teachers. This reflected the continuing awareness on the part of the university of the relative importance of the two disciplines. The first class of eleven students in medicine was graduated in 1925.



Robert M. Shaw
PROFESSOR OF BACTERIOLOGY
1931 - 1949

In 1939, just at the outbreak of World War II, the Faculty of Medicine got out of the business of teaching basic sciences and required applicants to have completed two years of pre-medical studies in the Faculty of Arts and Sciences.

Although the undergraduate programmes were to remain essentially unchanged for a long while, the end of W.W. II in 1945 witnessed a significant awakening of interest in research in the basic sciences in the Faculty of Medicine. This was largely the result of Dr. J.B. Collip's world-class work on the parathyroid hormone.

In 1945, the year when the M.Sc. program in Bacteriology actually began, there was a total of eighty-two students enrolled in all of the M.Sc. programmes in Basic Medical Sciences in the faculty.

This (1945) was a momentous year for another reason as well. Tats Yamamoto enrolled in the B.A.(lab.tech.) program, receiving his B.A. in 1948. At that time the department was geographically divided, with the "basic science" part, later to be referred to as the "Division of Microbiology", being housed in the basement of the east wing of the now Dentistry-Pharmacy building which was then also home to medicine dentistry, pharmacy and chemistry. The provincial laboratory and most of the teaching and research laboratories for clinical microbiology were in a recycled wooden army hut located on the south side of 89th Avenue, somewhere between where Education north and the new L.R.T. station now stand. Upon graduation Tats worked as a technician in the preparation room of the Department in the Medical Sciences Building (now the Dentistry Pharmacy building) and in his spare time he worked on his M.Sc. under the newly appointed

Department Head Dr. R.D.Stuart (*vide infra*). He graduated in 1951 and was immediately appointed as an Instructor in the department until he left for Yale to do his Ph.D. in 1958.

It is during this period that Tats made the first of his many significant contributions to this Department. His successor as chief technician, who shall, for reasons of delicacy, remain nameless, was a spirited youth who moved in the fast lane even to the point of occasional minor skirmishes with the law. One morning he arrived at work and told Tats he needed the morning off in order to visit the V.D. clinic. After some discrete questioning Tats ascertained the probable cause, handed the sufferer a box of microscope slides and suggested that, before he went for treatment, he should go to the washroom and prepare some smears of the exudate. The slides of Gram-stained clinical specimens of *Neisseria gonorrhoeae* in our preparation room which have been used as demonstrations in our teaching labs for lo these many years are evidence of Dr. Yamamoto's (and Mr. X's) dedication to academic principles.

Upon completion of his Ph.D. at Yale and a post-doctoral appointment at the University of Toronto, Tats rejoined the department as an Assistant Professor in 1962.

In 1947, another key player in the unfolding drama, Gordon E. Myers a graduate in Pharmacy and a M.Sc. from the U. of A., joined the staff. He subsequently took a leave of absence to finish his Ph.D. at McGill in the laboratory of E.G.D. Murray (father of R.G.E. Murray of the University of Western Ontario), one of the pioneers of, and, arguably, the most colorful character in the history of Canadian microbiology. It was Gordon Myers who spearheaded the drive to establish teaching and research in basic



Robert D. Stuart

PROFESSOR AND HEAD, DEPARTMENT OF BACTERIOLOGY

1949 - 1964

microbiology on this campus, as well as the divorce of this department from the Department of Bacteriology and its relocation as a separate entity in the Faculty of Science, but before we can appreciate those events, we must understand Gordon's boss at that time, the fabled R.D. Stuart.

In 1949 Robert D. Stuart M.D., D.Sc., D.P.H. (Aberdeen, Glasgow) was appointed Professor and Head of the Department of Bacteriology, a position he held until 1964. In 1950 he was given the additional responsibility of Director of the Provincial Laboratory of Public Health, a post he held until his final retirement for health reasons in 1967. He then returned to Scotland where he died shortly after.

Development of Microbiology in the Faculty of Science

It is with “R.D.” as he was universally called (behind his back- anyone, even his own mother one suspects, daring to call him anything but “Dr. Stuart” to his face, would be riveted with a glacial stare and then imperiously ignored) that the establishment of Microbiology as an independent entity began. It also marked the beginning of my own personal experience with this department since he was my Department Head when I arrived in 1960. Perhaps, therefore, a brief character sketch of this unique and powerful man might be in order.

R.D. Stuart was a Scot who, like so many of his countrymen, clung tenaciously to his old world ideas and prejudices. His research centered on a search for natural reservoirs of leptospira among small mammals of the north. Although he was not notably successful in this regard he is well known as the discoverer of “Stuart’s Transport Medium” a medium which is still widely used for the transport of clinical specimens for bacteriological analysis. Under his directorship, the Provincial Laboratory grew steadily in both size and importance but, as we shall see, he adopted a more reactionary stance with respect to changes in the academic department under his control. He was a widely read, interesting and informed conversationalist with a sharp and witty sense of humor. Unfortunately, he also had some of the less charming Celtic traits and could change character in a moment becoming stubborn, intolerant, cuttingly sarcastic or even abusive. The stories surrounding him are legion and I think his character can be best illustrated by relating just a few of them. My chief sources of the pre- 1960 Stuart sagas have been Tats Yamamoto and Art McKinnon.

He was perhaps most famous for being stingy (thrifty, to a fellow Scot) with both university and personal funds. As with most highlanders, oatmeal formed an important part of his diet. Rather than pay the insignificant price for this commodity at the grocery store, he would buy great sacks of it in bulk from the Strathcona feed mill, sending a university truck and driver to pick it up and deliver it to his house (also a University freebie) for him. It was also widely rumored that, in order to save the cost of a stamp, which was four cents at that time, he would enlist the long-suffering university driver to take his utilities bill downtown to the utilities office for payment. On at least one occasion it is rumored that he gave the bill to the driver on the final due day because of other duties, the driver was unable to make it to the utilities office before closing time and so he paid the bill on his way to work the next day. R.D. demanded that the driver pay the resultant late payment charges out of his own pocket..

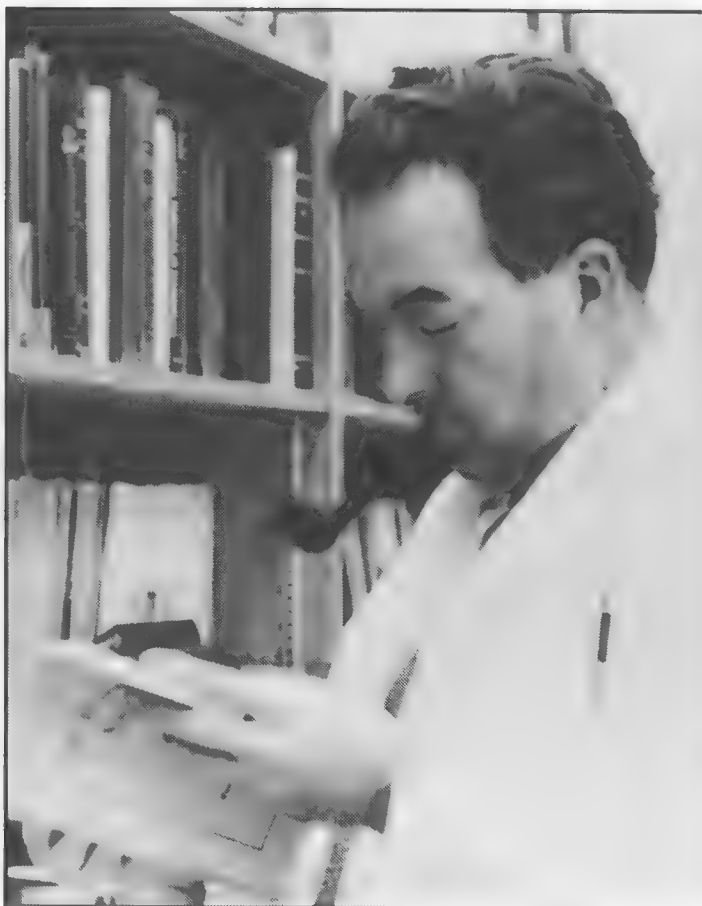
R.D. was also an extremely autocratic person with what amounted to academic tunnel vision. He was the nominal supervisor of Tats' M.Sc. research on the evaluation of anti-Streptolysin O titres in the diagnosis of streptococcal infections. The work was so interesting to the clinicians with whom Tats had obtained the diagnostic and relevant clinical data, that they invited him to present his results to a meeting of the local medical society. R.D. refused to allow him to speak on the grounds that since Tats was not a physician, he could not possibly know anything about the subject.

To be fair, not everyone regarded R.D. as a villain. Art McKinnon relates the story of the time his father, who was in charge of the laboratory animals for the Department as well as for the Provincial Laboratory, approached R.D. with the request that a

helper be hired for him. As he usually did with requests involving expenditure of money, R.D. tried to shrug this off. However, Joe McKinnon, who had raised thirteen children through the depression and was famous for his ability to chew tobacco, dip snuff and smoke a pipe all at the same time, wasn't a bit intimidated by his boss's bluster and suggested that instead of arguing, R.D. should come up and work alongside him and see for himself what was involved, saying: "You'll never last a week". The following Monday morning R.D. appeared in coveralls and plugged away as Joe's helper. After a day or so of this he gave up and Joe got his assistant. R.D. undoubtedly recognized in Joe an individual who was as hardworking, crusty and stubborn as himself -to which those of us who work with Art might add: "like father, like son."

No discussion of R. D. would be complete without mention of his ever-present pipe. This instrument would now surely be a prime target for those concerned with atmospheric pollution, but it was nonetheless a useful indicator. If the smoke was emanating in gentle puffs accompanied by a soft gurgling sound -which incidentally once led a newly-hired secretary to assume that R.D. had a serious respiratory ailment -then he was in a relaxed mood and could be safely approached on most matters so long as they didn't involve money. If, however the pipe was belching forth volcanic gouts of yellowish smoke with occasional showers of sparks, this meant trouble, and it was a foolish person indeed who ignored this danger sign and did not take cover.

Gordon Myers was appointed Professor of Bacteriology in 1957 and about that time was given the post of head of the "Division of Microbiology" within the Department of Bacteriology. This was a major job which meant that Gordon had total responsibility for design and teaching of all non-medical



Gordon E. Myers

PROFESSOR AND HEAD, DEPARTMENT OF MICROBIOLOGY

1962 - 1964

service courses the department offered. I had always assumed that the Division of Microbiology and its sister Division of Bacteriology which taught the medical and M.L.S. students, were official, duly established administrative sub-units of the Department of Bacteriology, but I have been unable to confirm this. It is possible that they were informal units with an equally informal title established by R.D. as a way of unloading all of these duties onto Gordon's shoulders without any expenditure of his own time or money.

I arrived on campus in October 1960, to join the "Division of Microbiology" which consisted of Gordon Myers, myself, three technicians, one graduate student (M.Sc.) and a secretary. We were housed in four woefully-equipped rooms on the ground floor of the east wing of the present Dentistry Pharmacy building. The department had no baccalaureate program and the only degree it could award was a M.Sc. (Medical Sciences). I was hired specifically to aid in the design and presentation of new courses with the objective of establishing a complete undergraduate program. This task was seriously compromised by the fact that our boss, R.D. Stuart, firmly believed and loudly stated that the only microbiology worth knowing was clinical (diagnostic) bacteriology, and it should be taught only to students in medical and paramedical programmes. In addition to this cheerful intelligence which greeted me on my arrival, I found that my laboratory was completely uninhabitable because of renovations which were going on to the dental clinic immediately overhead. We were scheduled to move into new quarters in the west wing, but as usual there was to be considerable delay before they were ready for occupation. As a probationary staff member, I couldn't afford to have my research put on hold for a year or more while

Technical Services fooled around with the renovations, so I went to R.D. with my tale of woe only to be told that he neither knew nor cared anything about my work and that he didn't want to be bothered with my troubles. To encourage me even further, he told me that, although he had nothing against me personally, he regarded Ph.D.'s as merely glorified and very expensive technicians. In case you are thinking of asking why I didn't board the next bus out of town, let me explain that I arrived here with a wife and three children who had already survived a long period of dignified poverty putting Papa through graduate school. In other words, we were broke. Instead my reaction was to blow my stack, and full of the outrage and brashness of youth, I stormed the citadel and demanded an immediate audience with Dr. Walter Johns, the wise and scholarly President of the university. He calmly listened to my semi-hysterical ranting, then quietly picked up the phone and called Dr. Walter McKenzie, the Dean of Medicine. I think I can remember the President's exact words:

"Walter, I have this very angry young man in my office who won't let me get on with anything else until we solve his dilemma."

After explaining my needs, he asked the dean:

"Will you see what can be done and call me back?"

The President and I chatted amicably about this and that for maybe ten minutes when the phone rang. It was Dean McKenzie who reported that he had spoken with Dr. McGregor, the Head of Pathology, fondly known as "Black Mac" to generations of cowed medical students, who immediately provided me with an unused teaching laboratory plus space in a walk-in fridge both belonging to Pathology and located in the basement of the then Provincial

Laboratory building. This comfortable and most acceptable solution came from the joint efforts of a classicist, a surgeon and a pathologist, none of whom had any direct responsibility for my well being. Gordon Myers very kindly seconded Rita Hodges (*née* Elashuk), one of the departmental technicians to work with me in my new laboratory so that my research could and did get underway. The fact that one simple phone call accomplished so much so quickly is mute but irrefutable evidence that those were indeed simpler times. By 1962 our comfortable quarters on the third floor, west wing of the Medical Sciences building were ready for occupancy and this solved our space problems for awhile. This was also the year that Art McKinnon joined the department and set up our storeroom and equipment maintenance, thus beginning a service in this department which has been the envy of everyone on campus for the last 28 years.

It was obvious however, that the development of basic microbiology could and would not occur under the leadership of R.D. Stuart and that the task facing Gordon and myself was not only the design and implementation of a new academic program but also the establishment of an independent department.

When I arrived in 1960, the Department of Bacteriology offered the following degree programmes:

B.Sc.(Medical Laboratory Science) - a degree of interest to Registered Technologists and for which the calendar specified that:
"a candidate must have a satisfactory personality and physique."

B.Sc. (Medical Science) - a part of the medical curriculum requiring one additional year for

the candidate to become B.Sc., M.D.

Apparently the university did not care how this particular group of people acted or looked since no mention was made of either personality or physique.

M.Sc. (Medical Science) - bacteriology was one of a variety of basic medical sciences which could be chosen.

The departmental course offerings consisted of:

BACTERIOLOGY 201 (2-3) *3 - introductory microbiology intended primarily for dental hygienists, non-degree nurses, etc. This was a show and tell type course taught by whomever appeared to be the least busy.

MICROBIOLOGY 360 (3-3) *6 - introductory microbiology for students from all faculties who were serious about learning microbiology. It was the forerunner of the present MICRB. 193 - 265 combination and was then, as now, the students' first exposure to microbiology and was the course which awakened interest in further study in the field among enlightened students. It was taught in its entirety by Gordon Myers.

BACTERIOLOGY 361 (3-3) *6 - medical bacteriology available to all and leaning more heavily on laboratory diagnostic methods than on mechanisms of pathogenesis *per se*. This

was taught mostly by Provincial Laboratory and M.L.S. staff.

MICROBIOLOGY 501 *6 - reading course
plus the specialty courses:

BACTERIOLOGY 231 - introductory
bacteriology for nurses

BACTERIOLOGY 421 - medical bacteriology for
sophomore medical students.

When I wasn't occupied in tormenting the senior administration, my job was to prepare and present the following new courses which were introduced for the first time in the calendar in 1961:

MICROBIOLOGY 401 (3-0) *6 - introductory
immunology for general consumption
(enrollment about 30).

MICROBIOLOGY 402 (3-3)*6 - microbial
physiology and biochemistry. This was the
forerunner of the present MICRB 411/413
combination with a bit of MICRB 444 thrown
in (enrollment about 10).

MICROBIOLOGY 505 (3-0) *6 - current
problems in microbial physiology.

MICROBIOLOGY 506 (3-0) *6 - current
problems in immunology and virology.

MICROBIOLOGY 507 - seminar.

There was initially no enrollment in the latter three courses.

In addition, the calendar specified that there was

“lab. apparatus and bench space available for two to three graduate students”.

These would be candidates for the degree of M.Sc. in microbiology.

With this nucleus of a curriculum, Gordon Myers initiated the formal proposal that microbiology should be allowed to develop its own academic and research programmes and that this would be best accomplished as a separate department, independent from the existing Department of Bacteriology in the Faculty of Medicine. The wheels were already in motion to separate the Faculty of Arts and Science and it was logical that if a Department of Microbiology was to be created, it should reside in the new Faculty of Science. Strangely enough, R.D. Stuart's low opinion of basic microbiology and basic microbiologists worked to our advantage. He desperately wanted both us and our program out of his hair as well as his budget, so he actively supported the proposal during the subsequent administrative battles.

The struggle formally began on 14 May, 1962 when a committee of “Deans concerned” recommended that:

“The Division of Microbiology of the Department of Bacteriology, Faculty of Medicine be transferred to the Faculty of Science..... it is to be left to the Faculty of Science to recommend to G.F.C. and the Board (of Governors) the status which the group would have in the Faculty of Science.”

Two days later, Vice-President Cragg made a notice of motion of this matter to General Faculties Council which immediately appointed a committee chaired by Harold Brodie, Head of the Department of Botany, to look into the matter. In those days administrators and their committees never worked over the summer, so it wasn't until 29 October, 1962 that the proposal as modified by the committee was formally brought before G.F.C. for discussion and decision. Acting on the committee's recommendation, Vice-President Cragg moved that the Division of Microbiology, Department of Bacteriology, Faculty of Medicine be re-named the Department of Bacteriology and Virology and be transferred to the Faculty of Science. The motion was seconded by the Dean of Medicine, W.A. McKenzie, my erstwhile benefactor. Those of us who were members of the "new" department wanted to retain the name "Department of Microbiology" and so argued. R.D. Stuart also rose to his feet and spoke strongly in our support, saying that the name proposed by the committee was too restrictive and, threatened that if the committee's recommended name was adopted, he would initiate proceedings in the Faculty of Medicine to have his own department renamed the "Department of Medical Microbiology". I am certain that he didn't realize how prophetic this threat would turn out to be.

Gordon Myers, the Head-designate, proposed the reinstatement of the name "Department of Microbiology" as originally recommended, but this was once again strongly opposed by Dr. Brodie and also by Donald M. Ross the Head of Zoology, whose departments taught mycology and protozoology respectively on the grounds that, if we were given an all-inclusive name like Microbiology, it might be interpreted as giving us licence to infiltrate into the *sancta sanctora* of their jealously guarded

teaching and research preserves. After much sound and fury, the motion was withdrawn to try and resolve this dilemma. Without belabouring the point any further, the forces of righteousness eventually won, and on 28 January, 1963, General Faculties Council approved a motion by the Dean of Science, Dr. H. Armstrong, seconded by R.D.Stuart to establish the Department of Microbiology, and on 1 February, 1963, the Board of Governors decreed that:

"a Department of Microbiology be established in the Faculty of Science comprising the Microbiology section of the Department of Bacteriology under the Faculty of Medicine to be effective April 1, 1963."

It was noted in the B.of G. minutes that:

"....this action would not involve any costs, administrative or otherwise not presently in effect."

We had officially arrived. I am sure that those with experience in the administrative process will read between the lines and appreciate the incredible amount of time and effort spent not only in preparing and fine-tuning the formal proposals but also the incessant behind-the-scenes politicking about minute details, trying to prevent uninformed, but nonetheless fiercely opinionated, people from scuttling the whole proposal on the basis of trivial, and often completely irrelevant points. We all worked hard, but Gordon, as the Head-designate, was the primary target, and without his long suffering patience and willingness to take all this flack in pursuit of an ideal, we would not be where we are today.

Although we had been assigned a home in the Faculty of Science, our teething troubles were far from over. We had hardly

got comfortable when Donald M. Ross, one of the active opponents to the move, was appointed Dean of Science and began to interfere in the administration of the department. Gordon Myers again bore the brunt of this external pressure but I fear that on at least one or perhaps several occasions, I added, albeit unintentionally, to the disruption of his peace of mind. Gordon was always careful to solicit opinions from all his staff when making major decisions. In those days, unlike the present, my own lack of experience never seemed to dissuade me from speaking out when I might better have held my peace. At one point, we were authorized to recruit an additional academic staff member and, since I had been saddled with the unwanted job of teaching our course in immunology, I was desperately keen that this new person be an immunologist. It was hard to recruit good people to this new department in a relatively unknown institution in a remote corner of civilization, so applications for the job were few and for the most part unsuitable. One applicant stood out as being ideally qualified on paper and Gordon, against his better judgement, listened to my impassioned pleas and hired him sight unseen, without an in-person interview. This was unfortunate because this person was the only academic staff member we have ever had who was from the outset completely dissatisfied with all aspects of our operation. He accused his colleagues of deliberately sabotaging his experiments, for example by mixing up his mice (Art McKinnon : not guilty) or by attacking his equipment with a crescent wrench (Tats Yamamoto : we're not sure). He believed the students in his class were antagonistic to him personally and that we, his colleagues were somehow behind this. All of the turmoil, complaints, and counter-reactions from other staff and students catalyzed by this individual, not to mention the flack from senior administration who also got into the act, was laid, of course,

directly onto the plate of the Department Head. The staff member resigned his position and left the city in less than a year but by then the damage was done. Gordon was a quiet-spoken, sensitive and kindly man who treated all members of the department as friends. He was not flamboyant, but he had a vision and a singleness of purpose, stubbornness if you will, which carried us through our turbulent birth. He was the ideal man for that time, but unfortunately this sensitivity, which was much appreciated by his staff, also left him open to being hurt by these attacks. The combination of the long struggle to achieve departmental status, the external interference in departmental administration, the internal problems, and perhaps other personal reasons as well led Gordon to accept an invitation in 1964 to return to his first love, the Faculty of Pharmacy where he remained as Professor and Associate Dean until his retirement.

After a year of headless turmoil, Dean Ross orchestrated the appointment of Dr. Wilfred E. Razzell from the University of British Columbia as Chairman of Microbiology.

It was during this *interregnum* between the Myers and the Razzell administrations that a couple of important steps were taken for which I modestly feel I can take a modicum of personal credit. Firstly, we successfully recruited Chik Hyun Pai and Donald W.S. Westlake to the academic staff. Secondly, this was the year of the most famous in what has become a long line of memorable departmental Christmas parties.

This party was, as usual, held on the last afternoon before the holiday in the research laboratory next to the Chairman's office on the south-west corner of the second floor of the building and situated directly over the elegantly appointed office of the Dean of

Pharmacy. On that particular day there was a chinook and the balmy weather combined with the primitive ventilation system in the building, a large crowd and the normal lively nature of our functions, soon made the room unbearably hot necessitating the opening of the windows. When we finally wended our bibulous way home, no one remembered to close the windows and when the temperature plummeted to -30 that evening, the pipes in the room froze. Sometime later a janitor entered the room on his rounds and noting the chill, closed the windows and went on his way rejoicing. As soon as the room warmed up, the burst pipes thawed and commenced flooding the room. Two factors played a role here. Firstly, since it was the Christmas holiday, it was a long time before the flood was discovered. Secondly, the building was old and, as we used to describe a leaky ship, "lacked watertight integrity". In other words, the floor had lots of cracks and holes which meant that the water did not flood laterally, but poured straight down into the office of the Dean of Pharmacy on the floor below. The damage in our department was trivial but by the time the flood was discovered, the expensive carpet and some of the lighter pieces of furniture in the Dean's office were literally afloat. The damage was extensive, and since I was Acting Chairman at the time and nominally responsible, I was certain that my budding academic career was over. Fate stepped in however, and I was saved by a curious circumstance. The caretaker who had closed the windows neither spoke nor understood English at all well. When questioned by the investigating S.W.A.T. team, he assumed that they were accusing him of being totally responsible and he categorically denied that anything untoward had happened on his shift. The more they questioned him, the more he stonewalled, until finally the union representative was brought in and the whole thing degenerated into an argument about workers' rights.

Eventually the university decided that this was leading nowhere and wrote it off as some sort of act of God, thereby letting both the hapless janitor and your humble correspondent off a very sharp hook. The Dean of Pharmacy, Dr. M. Huston, in addition to being a scientist was also an award-winning author of humorous writings. We thought such a person might appreciate a light touch to all these unpleasant proceedings so, at Art McKinnon's suggestion, the department sent him a ribbon-bedecked umbrella with a sympathy card. His secretary later told me that unfortunately, our thoughtful and wholly appropriate gift did nothing to calm the Dean's anger and it was a considerable period of time before his famous sense of humor was in evidence whenever his thoughts turned to the Department of Microbiology. In bringing to light the true facts of the mysterious "Flood of '65", I have been assured by counsel that there exists in Canadian jurisprudence a statute of limitations which protects me from *post facto* prosecution.

W.E. Razzell was one of the more distinctive characters this department has had the pleasure of hosting. Although his tenure here was short, it was in a sense tumultuous and I would be remiss as a historian if I did not devote some space to the highlights of his administration. I first met Bill Razzell on the west coast when we were both keeping Canada safe for democracy as distinguished members of Her Majesty's Canadian Naval Service and long before either of us had any interest in microbiology. Our paths crossed again at U.B.C. when I was a graduate student in Agriculture and he was a postdoctoral fellow in the laboratory of Nobel laureate-to-be H. Gobind Khorana, in whose laboratory I was doing some of my analytical work. He went to California and I to Chicago, not to meet again until his name appeared on the list of applicants for our newly vacated position of Department

Chairman. His application was impressive beyond doubt and was accompanied by letters of reference from no less than three persons who had either won or were about to win the Nobel Prize - Joshua Lederberg, Arthur Kornberg, and H. Gobind Khorana. Dean Ross was overwhelmed by these awesome credentials and offered him the job at once. I don't know the details, but I suspect that Razzell extracted some impressive concessions from the starry-eyed Dean after which he accepted and arrived on campus in the summer of 1966, bringing with him two Ph.D. students. One of these was a very bright young man named Richard von Tigerstrom, while the other, now an Edmonton physician, was a free spirit who enjoyed chemistry as a hobby as well as a professional pursuit and amused himself by synthesizing low-impact explosives and other recreational chemicals in the laboratory in his spare time.

It was with this appointment that Dean Ross' underlying motive became apparent. His plan was to unite the departments of Botany, Zoology and ourselves as a single Department of Biology and in his recruitment he had given Razzell the mistaken impression that this was an imminent possibility and that he, Razzell, was a front-runner to be Chairman of this proposed mega-department. For dreams to become a reality on this campus however, a certain amount of due democratic process must be followed and you can imagine how much agreement was achieved between three classically-orientated departments, each intent upon preserving its long standing traditions, and the upstart "new kid on the block" who wanted to move biology towards a more cellular perspective and, what is worse, was proposing such revolutionary departures as the inclusion of organic chemistry and biochemistry, as required courses in the curriculum. Meetings were held but the futility of the task became immediately apparent even to the Dean,

and he eventually backed off. His retreat was temporary however, for he quickly came back with a watered-down proposal to merge the Departments of Microbiology and Genetics. Although some good arguments could be made for this proposal now, the situation was quite different at that time. The Genetics department actually consisted of two segments. A small but active group of what we would now call cell biologists was emerging and amalgamation with them could have been a positive thing for all concerned. However, there was also a large and influential group of "classical" plant and drosophila breeders who were not at all sympathetic to our goals and who likely would have been much more at home in a department of plant science or entomology than with the likes of us. Just as an aside, David Suzuki, who was an excellent geneticist before he went into show business, was hired by the Department of Genetics from the University of Chicago but, because of the inter- and intra-departmental turmoil, left for U.B.C. in less than a year. In reality, the proposed amalgamation had nothing to do with academic considerations but was simply a plan on the part of the Dean to reduce the number of competing Chairmen he would have to face by combining these two troublesome units. I believe that three meetings in all were held during which we never got beyond discussing, but not agreeing upon, possible names for the new unit. No sub group would tolerate being omitted from the title, and each department wanted to be named first. The final impasse occurred when we all voted for: "Department of Microbiology, Cell Physiology and Genetics" while the geneticists to a man held out for "Department of Genetics, Cell Physiology and Microbiology". Bill Razzell himself, mercifully but unwittingly, brought all this silliness to a rapid end when he opened our last interdepartmental meeting with the announcement that if these merger talks were to continue it was to be on the clear understanding by all concerned



Wilfred E. Razzell

HEAD, DEPARTMENT OF MICROBIOLOGY

1966 - 1969

that he, Razzell, would be the Head of the new combined department. Upon receipt of this sobering and totally unanticipated intelligence, the geneticists, who were already becoming a little alarmed by Bill's aggressive personality, got up and walked out of the meeting, never to return, thus writing *finis* to the Dean's second plan.

There is no doubt that Bill Razzell was a highly intelligent, in some respects brilliant, scientist who not only had a wealth of experience in the then-fashionable physiological approach to microbiology, but also was extremely well informed on a wide array of unrelated topics. He was good to the staff and in many ways appeared to be the ideal choice to lead us down the paths of righteousness in our development into a modern teaching and research department. Unfortunately however, he rather quickly began to experience some difficulties in his dealings with other departments and the administration. He was beyond doubt the single most self-confident individual I have ever met and would enter fearlessly into debate on any topic from architecture to Zen Buddhism with any expert at any time. His debating tactic could be kindly described as aggressive but was often overtly insulting. He believed that the highlight of any person's day was to be brought face to face with his own errors or shortcomings, preferably in front of a large audience. His formidable reputation, his obvious knowledge, plus his usual gung-ho attack on all whose views differed from his own, gained him some initial success, but eventually it became counter-productive. Perhaps one example will suffice.

During this time we were getting ready to join our biological colleagues and move into the planned new Biological Sciences Building. Razzell claimed credit for designing the present

Microbiology wing but this is not exactly correct. The real work in this design was done by Gordon Myers with Art, Tats and myself, and latterly Chun Pai pitching in. We were told that we had a fixed amount of floor space on three floors, where the bearing walls were and from there we made all the decisions regarding partitions, furniture and equipment that we required. It was a huge job and by the time Razzell arrived the building was already begun and they were nearly ready to start interior construction. Almost his first official act was to throw a wrench into the works by insisting that the whole plan was unworkable and obviously designed by cretins. Such was his impact at that time that work stopped and we went back to the drawing board for this wing. When all the dust settled, the sum total of the changes he demanded, and got, were as follows:

1. The department office was relocated from Dr. Westlake's area in the northeast corner of the fourth floor to its present location on the northeast corner of the third floor.
2. A plan to have windows into the corridor walls of the staff offices on the fourth floor was scrubbed.
3. Traditional see-through stand-up laboratory benches in M-245 were replaced by the present ones with their high stainless steel splash guards and swing-away stools.

The one thing that this exercise in confrontation did accomplish was to delay our entrance into this building by at least one full year.

Razzell's unique self confidence and forthright manner also offered some lighter moments. One which comes to mind was a

memorable dinner party for the academic staff at his house. After the aperitifs and a superb meal prepared by his charming wife Mary, the dining room table was swept clear, cards and chips produced and the evening's entertainment, five-card stud poker, twenty-five cent betting limit, terms strictly cash, everyone required to play, was announced. If, as we suspected but could never prove, his plan was to recover some of the costs of the entertainment, it backfired, because Nan Pai, wife of Chik Hyun Pai, a recent addition to our staff, all the while protesting with girlish innocence complete ignorance of gambling or card games of any sort, proceeded to wipe out the rest of us, including her husband and our host. At these stakes this did not take long and by nine o'clock the game was over and we were all broke, sitting back anticipating a little light conversation and perhaps a nightcap or two. Razzell excused himself, left the room only to return five minutes later in his pajamas and dressing gown holding, I kid you not, a toothbrush. He announced that we could stay on if we wished, but he was going to bed. There was a scramble to exit and we all wound up on the street at 9:20 wondering what had gone wrong.

At the time of Razzell's arrival there was a very active interest in the game of bridge in this department, and at nearly every coffee break, lunch hour, etc. foursomes would gather to squeeze in a few hands and, as often happens, these bridge breaks became longer and longer with time. This did not escape the Chairman's attention, and he, quite reasonably, decreed that the playing of bridge on company time would cease forthwith. He circulated a memo to the effect that he considered chess to be the ideal sport for whiling away idle moments, since the boards could be left untouched and a game once started could be interrupted and recommenced at will.

He fancied himself as a chess player and in his heart of hearts envisioned a departmental championship with himself as the obvious choice for the title. To show us all the way, as well as to intimidate future opponents, he issued a challenge to one of my graduate students whom he was confident he could beat handily. The student, Charles Shobe, was deceptive however, for behind an innocent exterior lurked a strongly competitive and skilled gamesman. I don't understand chess strategy but apparently Charles suckered the Chairman into falling into a trap and ignominiously defeated him after something like eleven moves. That very day, another memo was circulated condemning all games as a frivolous waste of time and extolling the virtues of learned conversation on scientific matters as an approved pastime during coffee breaks.

It was in the Razzell years that the incident occurred which has become arguably the best remembered in all the departmental folklore. In 1967 when I was on sabbatical in Belgium, Razzell hired one Dr. Georges Balassa as my replacement. The appointment was originally for two years, with the option of converting it to a permanent post in the event of my failing to return. Georges, who was born in Hungary, educated in France and had considerable post-doctoral experience in the U.S.A, was a talented scientist who had done some elegant studies in the field of bacterial sporulation. He also maintained an active interest in the theater and felt himself to be a person of impeccable taste and artistic awareness who had somehow found himself in a remote and culturally deprived backwater. He likened Edmonton to Siberia, with more fast food outlets and better central heating. I found him to be an astute scientist, cooperative, and in spite of his prejudices, a very likeable and interesting person. He was,

however, a genuine flake and his affectations and condescending wit soon put him on a collision course with Razzell who was by contrast an ultra-pragmatist who wanted the spotlight for himself and who expected unquestioning acquiescence from his departmental staff. When it came, the crisis was dramatic. The department had only one walk-in cold room which housed most of our teaching and research materials. Balassa had a collection of mutants of *Bacillus* sp. with defects at various stages of sporulation. In those days, such a library of mutants could only be prepared by the tedious procedures of mutagenesis, selection, screening, etc. and thus this collection, which was the core of his research, was naturally highly prized by him. One day while shopping with his wife, Razzell spotted a mouldy canteloupe in the supermarket. This, thought he, was an unparalleled opportunity for students in our introductory course to experience first hand the thrill of scientific discovery by recreating the original experiment of Kenneth B. Raper of the Northern Regional Research Laboratory of the U. S. Department of Agriculture who isolated *Penicillium chrysogenum* NRRL 1951 B25, the fungal strain first used in the successful mass production of penicillin by submerged culture, from just such a mouldy canteloupe in Peoria, Illinois in 1941. Razzell purchased the canteloupe, much to the surprise of the store clerk, and triumphantly bore his rotting treasure back to the department, storing it alongside Balassa's cultures in our one and only walk-in cold room. Georges was understandably disturbed at the prospect of his world-class collection of mutants being contaminated by the mold spores emanating from Razzell's classroom project. In spite of his bravado, Georges, like the rest of us, was a little afraid of Razzell so, rather than confronting the Chairman directly, he chose to yell at our talented but very gentle preparation room technologist, Maxine Coombs and demand that

the offending object be removed forthwith. She relayed this suggestion to the Chairman who responded, also at the top of his lungs, that no one was to lay a finger on his beloved project. Poor Maxine felt as if she was standing between two angry pit-bulls but, since Razzell was a Chairman whose bite could be worse than his bark, she wisely decided to let the canteloupe stay put. This *contretemps* came to a head one afternoon at approximately 3:15 p.m. We had already begun our long-standing tradition of having coffee in the hall and on this particular day nearly the entire staff, including Razzell, was seated at the end of the hall, about 30 meters from the cold room door. Balassa entered the cold room and, seeing the hated object still there, let out a roar. The combination of his Hungarian : French accent and his outrage caused the message to be somewhat garbled but the gist was:

"I said I wanted this @#%&&@# thing the %%^& out of here...."*

From here on his monologue became increasingly incoherent and it culminated with him taking the mouldy canteloupe and firing it down the hall. It was obvious that he was aiming at the Chairman and, given the distance and the awkward nature of the missile, it wasn't a bad attempt. The line was good and the fruit held together while in flight, but it fell about three meters short of the primary target. However, when it struck the floor it exploded in a most spectacular fashion showering walls ceiling and assorted innocent bystanders, including the Chairman, with well-rotted canteloupe juice and fragments of pulp. The ensuing silence was hypnotic. We survivors, sensing the impending battle, prudently decided to vacate the fallout area and lurked out of sight but within earshot to attend developments. We had not long to wait. Bill Razzell was never hesitant to level a sharply worded criticism at

any member of his department if he felt it was warranted but, to his credit, these critiques were delivered in private and never in front of other staff. In this case he made an exception, and, after a concise but precise summary of Balassa's major character flaws and probable ancestry, fired him on the spot. Georges had lost the War of the Canteloupe but he did manage to get in a very telling last blow. Bill had a strong aversion to the presence of Playboy-type calendars in the laboratories. He felt that they detracted from the purely academic image he wished for this department and had earlier circulated one of his forcefully-worded memos demanding their removal. Balassa, remembering this, collected an impressive number of the more specific centerfolds and sometime immediately prior to his departure secretly glued these inside drawers, cupboards, cabinets, incubators, etc. throughout the department. For the next six months, it seemed that every time Bill opened a door, he would be greeted by yet another full colour spread of some cutie and this would without fail elicit the desired response. It was one of the most successful and longest lasting practical jokes ever executed in this department.

This is not to say that there weren't some important achievements during the Razzell administration. For example, it was then that our graduate program was completed. Although by this time our Honours and Specialization undergraduate programmes and an M.Sc. program which we had more or less inherited from our days in the Faculty of Medicine, were functional, we lacked an accredited Ph.D. program. We had been working on this essential component almost from the beginning and by 1964 or so felt that we had the horses to offer the degree but, as usual, we ran into some opposition, this time from a different sector. The Dean of Graduate Studies at that time was Dr.

Arthur G. McCalla, a biochemist and former Dean of Agriculture. Dean McCalla was a good scientist who held strong views on academic standards and took it as a personal responsibility to see that this university did not offer sub-standard graduate degrees. He didn't oppose the idea of a Ph.D. in microbiology *per se*, he just insisted that we prove to him that we were indeed up to the task. Time and time again he sent us back to the drawing board until finally he agreed, grudgingly we thought, to give us special dispensation to admit one person, Sheila A. Berry, as a probationary Ph.D. (Microbiology) candidate. It turned out that this was in the nature of a trial balloon and the impasse with the Dean remained unchanged until it was time for Sheila's candidacy examination. The Dean of Graduate Studies had the rarely-exercised right to send an observer to such examinations but in this case he came himself. Being well aware of Sheila's abilities, and also of the fact that the department was under the gun, I had assembled as rigorous and expert a supervisory and examining committee as I could. The exam lasted nearly four hours and the Dean sat through it all, in spite of the fact that he had severe asthma and several of the committee members, including myself, smoked incessantly throughout the proceedings. Sheila performed brilliantly and on the way out, Dean McCalla came up to me and said simply:

"You've made your point."

At the next appropriate meeting of the Faculty of Graduate Studies the proposal that the Department of Microbiology be accredited to grant the Ph.D. degree was put forward with the support of the Dean. From there on, the remainder of the administrative hurdles were routine and in 1966, we received official accreditation to offer the Ph.D. degree. With this, our status

changed from that of a developing department to that of a fully functional one and from then on, in the competition with other departments and institutions for students and support, we were playing on a level field. Sheila was unaware at the time that the fate of not only her degree but also of the future of the entire graduate program in microbiology on this campus were riding on her performance. She simply assumed that I was some sort of academic sadist who enjoyed watching students suffer through long tough exams. She graduated in 1969 and went on to a successful career beginning with post doctoral appointments at the Pasteur Institute in Paris and here at U.of A. and subsequently an academic appointment at the University of Victoria. This department owes her a debt of gratitude for her role in helping us achieve this important goal.

Razzell's tenure also saw the appointment of Michael Piechowski, a virologist, to our staff and the recruiting and interviewing of Gerald W. Stemke, although Gerry's actual arrival in the department coincided with the start of Donald Westlake's reign as Chairman.

After a little over two years in the Chair, Razzell suddenly grew tired of Edmonton or perhaps he heard distant thunder. In any case, late one Friday afternoon as the last item on the agenda of an informal staff meeting, he calmly announced that he had resigned and would be leaving in about six weeks time. He had given no prior warning of this decision to anyone, nor had he made any arrangements for the continued academic or financial support of his students. The two graduate students that came with him from U.B.C. had nearly finished their programmes and so were not seriously affected by this, but the M.Sc. and the Ph.D. students he acquired here were justifiably alarmed. The surviving academic

staff moved quickly to ensure that the supervision of these students' programmes and their financial support would continue and in the long run it all worked out, for the students in question not only graduated more or less on schedule but also went on to successful careers. Be that as it may, insofar as his departmental colleagues were concerned the ethics of this sudden departure without warning and without any attempt to transfer administrative or academic responsibilities were questionable and I think that this one act engendered more ill feeling than all his previous confrontations combined.

At the time of Bill Razzell's precipitate departure we had a lot of different irons in the fire. Our new graduate and undergraduate programmes were just settling in, we needed to attract new academic staff and students in what was an extremely competitive market, the move into the new Biological Sciences Building was imminent, to name a few. In other words, we were left in an administrative vacuum at the precise moment when our need of strong leadership was most urgent. For once Dean Ross recognized this need and moved quickly to confirm the appointment of Dr. Donald W.S. Westlake as Chairman. Don Westlake, a graduate of U.B.C and the University of Wisconsin, had joined the Department in 1966 from the Prairie Regional Research Laboratory of the National Research Council in Saskatoon. He had impeccable research credentials, was considered an excellent teacher with a quiet but determined manner which allowed him to get along well with staff and students alike. Don exuded an aura of calm competence and stability which was exactly what was needed after our years of conflict and turmoil and we all breathed a sigh of relief when his appointment was confirmed. This did not mean that the administration's designs on our chastity were over. In a



Donald W. S. Westlake

CHAIRMAN, DEPARTMENT OF MICROBIOLOGY

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moment of unguarded camaraderie one evening at the Faculty Club some years later, Dean Ross admitted to me that one of the reasons he had supported the soft-spoken Westlake to succeed the bombastic Razzell as Chairman was that he believed that Don could be readily coerced into supporting the proposed merger with Genetics. Don, however believed, as did we all, that such a merger would seriously weaken both programmes and resolutely opposed the idea. For the next twenty years, he proved to be an untiring and effective champion of this department's rights throughout the corridors of power. Dean Ross went on to admit that he had seriously underestimated the iron will that underlay the calm exterior of our new chief. The serious proposals for merger ended in 1976 when Donald Ross stepped down as Dean of Science and to be succeeded by Kenneth B. Newbound, a physicist with fewer preconceived ideas of what should constitute biology. By this time, partly because of Don Westlake's untiring efforts and partly because of the increasing credibility of our own research and academic programmes both on and off campus, our *raison d'être* as a department was no longer seriously challenged. Of course the battles with administration and the internecine wars with other departments within the faculty continued unabated, but we now entered into the intra- and inter-faculty competitions for our fair share of the spoils on a more equal footing with our litter mates.

It is true that Dean Ross was opposed to our existence as an independent department, but if my description of the events has given the impression that he was a vindictive person who was "out to get us" for personal reasons, then I have done a serious injustice to one of this university's most distinguished scientists and teachers and to someone whom I respected and valued as a colleague and a friend. Donald Ross was himself a productive

biologist with a well-deserved international reputation as a researcher and teacher. It is not surprising that he held strong opinions as to how biology should be presented on this campus and what the priorities should be. We did not share his views with respect to cell biology, but these were honest differences of opinion and the battles were always fought on purely academic grounds. He was in all respects a “foeman worthy of our steel.”

It was with mixed feelings that we contemplated our move to our present quarters in the new Biological Sciences building. Although we had clearly outgrown our old quarters, they still had some desirable aspects. We were all on one floor, had to share laboratory space and facilities, which led to a certain camaraderie. We were also located directly underneath the Department of Biochemistry, which we regarded at the time as being our closest and most sympathetic colleagues, and informal interactions with their people, seminars etc. were a daily occurrence. Our new facilities were palatial in comparison but we were now to be spread over three floors and a long way removed from Biochemistry which would inevitably result in less frequent contacts. One of the biggest problems in the old quarters was the lack of refrigerator space. I alluded to this in the saga of the mouldy canteloupe but in fact no one had exclusive use to even the smallest refrigerator and this caused an unending array of problems of varying severity. One of my favourite fetishes has always been that all stored material should be clearly labelled and, to impress my students with the importance of this, I periodically threatened to throw out anything of theirs I found that was not identifiable. One day one of my students, ever anxious to please, cleaned out the refrigerator in my laboratory, dutifully discarding any flasks that were not recognizably mine. What she didn't realize was that Tats

Yamamoto also used this fridge to store his stocks of adenovirus strains which unfortunately fell into the category of being badly labelled and hence were expunged. I have always felt that this was a regrettable but understandable mistake but it is seared more deeply into Tats' memory. I must admit that, after an initial eruptive reaction at the moment of discovery, Tats expressed his disapproval to the student and to me in a restrained and gentlemanly manner but to this day, one need only mention the student's name in his presence to see the old fire rekindle in his eyes.

The actual move took place in August 1970, which meant that we had to relocate at least six different research groups plus our entire teaching and administration facilities and be ready to function when classes started in September. Art McKinnon designed and supervised this truly remarkable feat of planning and organization, ably assisted by Hedy Tebelmann, Mary Illes and Maxine Coombs and the whole thing took less than one week with an absolute minimum of snafus. The academic staff aided immeasurably by doing just what we were told and refraining from making unenlightened suggestions.

Under Don Westlake, the department continued on its path of trying to upgrade our graduate and undergraduate programmes which meant attracting new staff and students. In the acquisition of staff, Westlake's objective was twofold. Firstly he wanted to strengthen the area of microbial physiology, and to this end, Richard von Tigerstrom, who by this time had completed his Ph.D. under Bill Razzell and subsequently a post-doctoral appointment with Mike Smith in Biochemistry at U.B.C., was appointed to the academic staff in 1969. The following year Michael A. Pickard who had been lured to these shores from Britain by the offer of

post-doctoral positions in Don Westlake's lab and subsequently with A.R.P. Paterson in the McEachern Cancer Institute, also joined the academic staff of the Department. It was also in 1970, obviously a banner year, that we broadened the expertise in the department by acquiring the services of Gerald W. Stemke, our immunologist, and Kenneth L. Roy who has led us down the helical path to the world of molecular biology. Our interest in ecology actually began when a classical soil bacteriologist, F.D. (Ted) Cook, Professor of Soil Science in the Faculty of Agriculture was appointed an Adjunct Professor in this department, but it was in 1976 when we outbid the University of Guelph and acquired the services of William J. Page, an expert in nitrogen fixation that the department formally acquired its physiological perspective of the myriad of problems of the ecology of the soil.

Up to this point, the department recruited people with the goal of trying to teach those aspects of microbiology which we perceived as being important and which were not being taught elsewhere on campus. Virology was important so we recruited a virologist, the significance of immunology as a basic rather than just a clinical science had become apparent so we hired an immunologist, and so on. We had no reputation as a department upon which to build in the early years so we had no choice but to expand in that manner. As the number of publications from the department increased so did the possibility of concentrating on strength rather than diversity, and in the late 1970's Don Westlake began seriously expanding the concept of collaborative research in the department. Susan Jensen, a graduate of this department had just returned from a post-doctoral fellowship at U.B.C. and was hired by Don to work on an aspect of his antibiotic studies. This represented the beginning of the " β -lactam group", later to expand

into the “Streptomyces group”, and gave the department some credibility in the eyes of medical fund-granting agencies. Susan’s appointment was initially as a post doctoral fellow, but her work soon attracted widespread interest including that of the gurus at the Alberta Heritage Fund for Medical Research and she became our first A.H.F.M.R. scholar, and subsequently a full time member of the academic staff. In addition to this, A.H.F.M.R. has given the department a significant level of additional financial support in the form of studentships, fellowships, visiting scientist awards, equipment and travel grants, etc. As interest in this work grew, so did the number of contacts and collaborations with other institutional and industrial groups.

Don was also becoming increasingly involved in the area of environmental microbiology, specifically as related to the petroleum industry. To this end he brought Phillip Fedorak, a young chemistry graduate with a unique beard who was doing his Ph.D. in Civil Engineering, into his laboratory where he did most of his thesis research. After graduation, Phil joined the Department, first as a Professional Officer and then in 1985 as an Assistant Professor while still retaining his collaboration with Civil Engineering. Thus began the “Waste Disposal” group which has from time to time included others of our staff, such as Bill Page and Ted Cook, and, which, like the β -lactam group, has developed extensive national and international connections with other groups. Collaborative research has become the norm in the department and, although it is not possible to list them all, it seems to me that the abovementioned two groups served as important beginnings of what has become the central ingredient of this departments research philosophy and thus worthy of mention.

In 1986 there was another first. The B.Sc.(Specialization) and

B.Sc.(Honours) degree programmes in Cell Biotechnology were instituted to be taught and administered jointly by the Departments of Microbiology and Genetics. This was our first venture into the area of interdepartmental undergraduate programmes and, since this one has proven to be popular, I would not be surprised to see collaborations increase in the area of academic programmes just as they have done in research. An immediate benefit to us of the initiation of this program was that we were authorized to recruit additional academic staff member to the department. Hosmin Anwar, a pharmacist who had acquired not only his Ph.D. but also post-doctoral experience in the pharmaceutical industry in Britain, joined the staff in 1988.

The quality of the research and teaching by members of this department has been recognized over the years in a variety of traditional ways by our peers as well as by our students. I must, however highlight some awards of particular note which were won by our staff members. In 1985 Don Westlake was awarded a McCalla Professorship and the same year received the prestigious Canadian Society of Microbiologists Award in recognition of his contributions to microbiology in Canada. The following year he was awarded the University of Alberta Research Prize. In 1986, Phil Fedorak received the Francis W. Karasek Award for Environmental Science or as it is colloquially referred to, super sludge award. In 1990 this University honoured Gordon Myers for his long and distinguished service by conferring on him the degree of Doctor of Science, (*honoris causa*).

In 1989, Don Westlake announced that he was stepping down after 20 years service as Chairman of Microbiology. For the rest of us, the prospect of having to look for a new boss was somewhat disquietening. Although we all agreed that an external appointment

was needed to give us a new perspective, Don's long tenure in the Chair meant that each of us had him pretty well cased and had settled into his/her own comfortable, but somewhat deep, rut. Of the staff, only Art, Tats, Hedy Tebelmann and myself remembered the tumultuous process we had gone through long ago before we finally arrived at Don so perhaps we were more apprehensive than our naive and inexperienced colleagues. To our delight and surprise, the process went extremely smoothly from start to finish. Fortunately, an individual who not only met all of the academic criteria we hoped for but who was also a friend of long standing to this department, Dr. William Paranchych of the Department of Biochemistry of this university, expressed an interest in the job. The selection committee liked what they saw, Dean McDonald apparently came up with the appropriate bait to enable him to set the hook, and Bill joined the department as Chairman on July 1, 1989, bringing with him his entire research group, which gave the department instant international credibility in the burgeoning field of adherence mechanisms in bacteria. One of the terms of his appointment was authorization for an additional academic appointment and in 1990, Laura Frost a graduate of University of Alberta who had been a Research Associate in Bill's laboratory was recruited and joined the academic staff. The last staff acquisition as of this writing was the appointment of, our second AHFMR Scholar, Brenda Leskiw, an alumnus of our undergraduate and our Ph.D. program in Susan Jensen's laboratory, who is joining after completing a three year post-doctoral stint in the John Innis Institute in Norwich, England.

There is another group of people who deserve special mention. I think that it is fair to say that over the years this department has had the best support services of any unit on campus and this is

because we have been able to attract and keep excellent people. Art McKinnon has been with us from the beginning, and as a result our purchasing and storeroom facilities have always functioned smoothly and efficiently. Our preparation and wash-up services have also benefited from a succession of talented and responsible people starting with Maxine Coombs, Hedy Tebelmann, Mary Illes and others who worked in the department for a long time and established a tradition of excellence and mutual support which has been passed on to their successors. The front office, with its equally crucial responsibilities of fiscal bookkeeping, student records and secretarial services, unfortunately has had a more tumultuous history. In our earlier years there were frequent staff changes, some good and some not so good, and on several occasions the department found itself on the brink of disaster because of serious sins of commission as well as omission in our administrative sector. The light at the end of this particular tunnel became visible in 1970 when Dale Shelmerdine joined the staff and began the arduous task of bringing order to our financial chaos. In 1979 Joan Hoppenbrouwers was appointed Departmental Secretary and began a similar cleansing process in the front office. Between them, and with the help of the excellent people they have attracted and trained, they have brought the "paperwork" aspect of the department in line and up to the high standards of efficiency that we now enjoy.

It is impossible to overestimate the importance of these services to the students and academic staff in the department. Although we all understand that fiscal and administrative management as well as preparatory and wash-up services are essential components of a large multifaceted institution, we are frequently unaware of the complexity of these tasks. The fact that



William Paranchych

CHAIRMAN, DEPARTMENT OF MICROBIOLOGY

1989 -

we can get on with our teaching and research with little or no hassle beyond providing a few signatures now and then, is the result of the dedicated efforts of a support staff who have not only given freely of their time and talents, but have also injected their personalities into their jobs and represent an integral part of what has become a close-knit department. Without their efforts we would have chaos and besides, it would not be nearly as much fun to come to work.

Through a Glass Darkly

For what it is worth, so far this has been a description of some of the events which I remember as having been important in our arriving at our present position on campus, and the reader who chooses to leave the narrative at this point will have the full complement of the facts as I know them. Over the years I have come to believe that in understanding any biological system, knowledge of the control processes is as important as that of the physiological events themselves. I have tried to relate what has transpired, and now I would like to end by expressing some personal views as to why it happened as it did.

One can actually describe our existence over the past thirty years in very few words. A logical first choice would be the word "change". Right from the outset this process of change has been continuous, firstly in the establishment of our program and subsequently in the modification of what we did and how we did it in our efforts to keep abreast of our highly competitive and ever-changing discipline. I have already mentioned the awakening of interest in collaborative research and over the last decade or so, interactions between Microbiology and other departments such as Chemistry, Medical Microbiology and Infectious Diseases, Civil Engineering to name just a few, have become the norm rather than the exception. In addition, the number of productive off-campus collaborations is steadily increasing and have included academic institutions such as the universities of Calgary, B.C., Queens, Washington, Tel Aviv, and Louis Pasteur in Strasbourg; government institutions like Fisheries Canada, Defence Research Board, A.O.S.T.R.A., and commercial interests such as pharmaceutical and petrochemical companies. This process reached, if not a peak then an elevated plateau, this past year when

Bill Paranchych along with Diane Taylor, Glen Armstrong, Wanda Wenman, Randy Irvin and Mark Pepler of the Department of Medical Microbiology and Infectious Diseases were named co-recipients of a Medical Research Council of Canada Centres of Excellence Award to establish the Canadian Bacterial Diseases Network which unites investigators from the universities of Victoria, B.C., Calgary, Alberta, Saskatchewan, Guelph, Laval, as well as the National Research Council and Connaught Laboratories. Changes of a more personal nature have occurred with the recent retirement of two of our long-term associates, Hedy Tebelmann and Tats Yamamoto, and the semi-retirement of Don Westlake. The normal aging process ensures that this trend will also accelerate over the next few years with the result that not only the perspective but also the personality of the department will change.

Another word one could choose to describe our history would be “struggle”. It seems that every single thing we have achieved over the years has come about only after we were able to overcome significant opposition. Our first struggle was to create a free standing Department of Microbiology and I have discussed that in considerable detail because I believe that, at that time, the development of our undergraduate and graduate and research programmes would have been impossible without the independence and academic freedom that existence as an autonomous department provided. At that time money was not a problem, so the creation of an independent administrative unit was a feasible way for the university to cope with a group of ambitious individuals with unorthodox views about biology. Actually, this was not an uncommon method of circumventing a variety of problems during periods of prosperity at this institution. You will

not find this in the official records of the university, which never give the real motivations which underlie changes, but it is conventional wisdom that the departments of Botany and Zoology were created in 1921 and 1922 respectively as essentially one-man units split off from the Department of Biology, primarily for the purpose of separating two individuals who could not get along. I don't need to rely upon rumor to ascertain the *raison d'être* of the Department of Genetics since I heard many of the complaints first hand. Courses in genetics have been offered in a variety of programmes for a long time at this institution but when a degree program in genetics was begun in the Faculty of Arts and Science, it was administered for many years by the Department of Plant Science in the Faculty of Agriculture. Some of the geneticists began to feel that their program was becoming too focussed on specific practical aspects such as plant breeding to the exclusion of newer more basic areas which were becoming of increasing importance. They felt that their voices were being drowned out in Agriculture and so, in 1962, to try and quell the political turmoil, Genetics appeared as a separate department in the Faculty of Arts and Science. In this respect their problems and the solution they sought presaged our own.

It is intuitively obvious that struggle, like change, will be an ongoing process. The adversarial approach has always been strongly favoured by this institution and although we never got everything we wanted, through a combination of argument and compromise, we did achieve some measure of success. The problem then, as now, was to get administrators to appreciate the etymology of the word "administer" (from the Latin *ad*: + *ministrare* "to serve") and to be prepared to listen to and be instructed by those of us who saw, and ultimately had to cope with,

the problems at the grass-roots level.

At the present time, the university is plagued by financial restrictions which jeopardize our ability to maintain those academic standards we fought so hard to achieve. It is obvious that the continuous creation of new administrative units as a method of conveniently solving problems is a luxury we can no longer afford and in fact there is now a strong thrust in the opposite direction by selective elimination of redundant or inappropriate courses, programmes, or even whole departments. We may be sure that administrators and other external experts will continue to make sweeping proposals, most of which will be wholly or in part unenlightened and it will continue to be the responsibility of the researchers and teachers to seek modifications which will minimize their deleterious effect on quality of teaching and research in our respective areas. In other words, the perennial attempts of administration to initiate change from the top down will have to be counterbalanced by equally continuous attempts by the active academic staff to design the changes from the bottom up. This is a large and unwieldy institution and perforce the process of implementing constructive change will always be a slow and repetitive one.

The academic staff, for their part, consistently posed an equally serious threat to progress for two main reasons. Firstly, although we, like most young academicians of my acquaintance, considered ourselves to be vaguely progressive in our political and socio-economic views, when it came to any perceived assault on our personal academic niches, we dug in and became as reactionary and defensive as moray eels. Secondly, like most of the active teachers and researchers we favoured as role models, we protested that we were far too busy to get involved, and were sorely tempted

to leave bureaucracy to the bureaucrats. The truth was that we really had no choice in the matter. If microbiology was to survive on this campus, it had to change in response to developments in the discipline and in society. Whether or not these changes were constructive depended in large measure on the willingness of the academic staff to actively participate in the process, and to accept the universal truth that, in addition to the scholastic and professional parameters which they rightly felt they understood best, there were also fiscal and political realities beyond their control which had to be served. We began by agreeing with the sentiment, if not the syntax, of the late Will Rogers when he said:

"I tell you folks, all politics is applesauce."⁽³⁾

and wound up by appreciating, albeit grudgingly, the maxim:

"Die Politik ist die Kunst des Möglichen."⁽⁴⁾

I have no doubt that this process will continue in perpetuity and I really do not foresee any changes in the ground rules. Since I seem to be on some sort of an epigrammic roll, perhaps you will permit me to quote one of history's most efficient, if least likeable, administrators:

In war..."Weapons change but man who uses them changes not at all"⁽⁵⁾

There is a third parameter that was essential to our development but that I am having difficulty in pinning it down to a single word. Perhaps "leadership" will do until I can think of a better one. I have already alluded to the leadership characteristics of our previous chairmen, but this also emerged from an unexpected source. We, the members of this department, have always enjoyed a relaxed informality laced with a bit of humor in

our dealings with each other. This tradition started in the early years when the staff members could not only work together but also on occasion relax together by going fishing or to a bar, or sometimes both on a Friday afternoon after work, and the like. The leader of this recreational therapy was Art McKinnon. As I have already said, from the outset Art has kept the department running by coping with the myriad problems of equipment procurement and maintenance, supplies, services, etc. but he was also the person who knew the whereabouts of the best fishing spots, the best lures to use, an inexhaustible supply of stories and the one who always had time to talk to a stressed colleague. For me, these informal get-togethers, like our parties, are the source of some of my fondest memories of this place. The time we tore the transmission out of Tats' new car, or when the bull made erotic overtures to my Volkswagen beetle, or when Mike Pickard dived into Lac Ste. Anne after his dropped pipe, had to be seen to be appreciated but have become indelibly etched into the folklore of this department. Of greater importance is the fact that they let us see each other not just as professors or technicians or whatever, but as three dimensional people and this made a world of difference when it came to dealing with each other about professional matters on the job. Art was instrumental in convincing all of us that more could be accomplished by working together than by a strict division of labor. Art has taught me personally a lot of things over the years and I regard him as one of my best friends, in spite of the fact that we had known each other for over two years before I could get him to call me by my first name.

I said that the characteristics of "change" and "struggle" will be ongoing in our development. Obviously this characteristic of "leadership" is much more nebulous and unpredictable and, as I

have tried to show, can arise from a variety of sources. I cannot give any advice on how the department might retain this character into the future, I can only express the hope that it will.

In closing, I propose to exercise the prerogative of the elderly to dispense a bit of unsolicited homespun philosophy. I do not think it unreasonable of me to hope that the efforts of all of us over the past thirty years will have built something with a degree of permanence, but I ask myself what it is, exactly, that I think should survive. Would I be devastated if this department which I worked so hard to help build should someday disappear in some grand new redesign of this faculty? I think not. Clearly, course contents and curricula must change in response to developments in the field as will, in all probability, departmental names and affiliations. It is no surprise that from its inception, the Department of Microbiology has faced a seemingly unending array of academic, political and financial battles both within and without our walls since the department has, from its inception, housed an amazing collection of intelligent, opinionated, outspoken people as its academic and non-academic staff and students. What is perhaps surprising to me is that, in spite of all this turmoil and frustration, I have found my job to have been both enjoyable and satisfying. The reason has been the people in this department with whom I have worked, argued, and occasionally played over the years. The university as a whole is too big and too dumb for anyone to identify with in anything but a nominal sense. The creation of this department gave us all a smaller sphere of reference in which each individual could recognize and be recognized for his or her contribution to the tasks at hand. In spite of great differences in personalities, we all shared a common goal, namely to turn out a first class product regardless of the deficiencies and foul-ups seen elsewhere on the campus. I

don't believe that I have ever had a request for help refused by a department member, be it an academic colleague, or a member of the front office, the wash-up or the prep room staff, if it was within his or her power to give it to me. Of even greater importance was the fact that although I often disagreed or even lost my temper with individuals, with the single exception alluded to earlier, I never once doubted their motives or commitment. It is called *esprit de corps* and it is every bit as important in a university department as it is in an army regiment. Whatever changes occur in the microbiology program, in whatever new administrative guise the teaching of cell biology becomes clothed, if the people sharing the task can recognize a subunit to which they can identify and, if this tradition of relaxed informality and mutual support within that group can be maintained, then the task of achieving and maintaining excellence in an institution which relentlessly pursues mediocrity, will continue to be not only possible, but at times downright enjoyable.

A recent event has made me confident that this will continue. In May 1991, the department held its first ever faculty retreat at the Banff School. In three days every aspect of our academic programmes was dissected and analyzed in depth and significant changes in design and perspective proposed. The points were debated with vigour, frankness, and humor, and the compromises arrived at all in a good spirit. What is significant is not just that we strengthened our programmes but that all members came to understand the nature of the problems as well as the rationales underlying the proposed solutions. This departmental unity of purpose gives these improvements the best chance of surviving the administrative gauntlet of question and challenge which must precede the transformation of proposals into programmes. It also

gave a boost to those ephemeral parameters of staff identity and morale. In spite of some initial skepticism, I believe that we were all impressed with this method of problem solving and I hope that it will be continued.

My academic career is nearing its end. This exercise has forced me to look back on more than thirty years of involvement with all aspects of this department and it has been surprising to me to find that when I call to mind the many crises faced and the many personal scientific and academic goals I failed to achieve, the humor and the personalities involved are much more memorable than the sense of urgency and frustration which seemed so crucial at the time. Microbiology on this campus is in better shape now than it was when I started. I was part of that development and in the process I was privileged to make the strongest and most valued friendships of my life. I could extend no happier wish to my successors than to say that I hope that each one, upon looking back on his or her career will be able to say the same.

Postlude

"Thus far with rough and all-unable pen, our bending author has pursued the story. In little room confining mighty men, mangling by starts the full course of their glory.....and for their sake, in your fair minds let this acceptance take." (2)

Bibliography

- (1) Shakespeare, William. "Henry V", Act I. Scene 1.
- (2) Ibid. Act V, Scene 2.
- (3) Rogers, Will. (1924) "The Illiterate Digest".
- (4) "Politics is the art of the possible" attributed to Reichskanzler Otto von Bismarck, *ca* 1925.
- (5) Patton, General George S. (1944) Letter to Cadet G. S. Patton IV.



Allen C. Rankin

FIRST PROFESSOR OF BACTERIOLOGY

1921 - 1949

APPENDIX I

Chronology

- 1914 - Teaching commenced in Faculty of Medicine.
- 1920 - U. of A. received a grant for upgrading medical education from the Rockefeller Foundation.
- 1922 - A full six year pre-medical and medical program was established in the Faculty of Medicine.
- 1925 - The first class in medicine was graduated.
- 1939 - The Faculty of Arts and Sciences assumed responsibility for teaching pre-medical science courses.
- 1955 - The M.Sc. (Microbiology) was first listed as an offering in the Graduate Studies calender.
- 1957 (approximately) - The “Division of Microbiology” within the Department of Bacteriology was established.
- 1962 - Faculty of Science created as a separate entity with H.S.Armstrong (Geology) named as the first Dean.
- 1962 - Microbiology moved into new quarters on 3rd floor, west wing of the Medical Sciences (now Dentistry Pharmacy) building.
- 1963 - The creation of a separate Department of Microbiology in the Faculty of Science was approved.
 - Honours B.Sc.(Microbiology) program approved and listed in the calendar.
 - M. Wyman (Mathematics) appointed Dean of Science.

1964 - D.M. Ross (Zoology) was appointed Dean of Science.

1966 - This department was authorized to offer the degree of Ph.D.

1968 - The four-year B.Sc. (Specialization, Microbiology) was listed in the calendar. This coincided with the initiation of the four-year specialization degree by the Faculty of Science.

1969 - The first Ph.D.(Microbiology) was conferred

- The department of Microbiology was authorized to offer the Ph.D. degree.

1970 - First B.Sc.(Specialization, Microbiology) was conferred

1970 - The department moved to its present location in the Biological Sciences building.

1971 - First B.Sc.(Honours Microbiology) conferred.

1976 - Fifth floor of the Microbiology wing in the Biological Sciences building was completed and occupied.

- K.B. Newbound (Physics) was appointed Dean of Science.

1981 - W.J. McDonald (Physics) was appointed Dean of Science.

APPENDIX II

Personnel and Dates of Appointments (chronological order)

Department Heads

Department of Bacteriology, Faculty of Medicine

Robert M. Shaw	M.D. (McGill)	1921-1949
Robert D. Stuart	M.B. M.Ch., D.Sc. (Glasgow)	1949-1964

Chairpersons

Department of Microbiology, Faculty of Science.

Gordon E. Myers	Ph.D. (McGill)	1962-1964
Wilfred E. Razzell	Ph.D. (Illinois)	1966-1969
Donald W.S. Westlake	Ph.D. (Wisconsin)	1969-1989
William Paranchych	Ph.D. (McGill)	1989 -

Academic Staff (excluding the above)

Tatsuzo Yamamoto	M.Sc. (Alberta)	1951 (Instructor)
	Ph.D.(Yale)	1962 - 1990
James N. Campbell	Ph.D. (Chicago)	1960 -
Chik H. Pai	M.D., Ph.D. (Minnesota)	1966 - 1975
Salvatore Margherita	Ph.D. (California)	1964 - 1965
Michael Piekowski	Ph.D. (Wisconsin)	1967 - 1969
Fred. D. Cook	Ph.D. (Edinburgh)	1964 (Soil Science)
		1969 - 1983
		(joint appointment in Micrb.)
Richard von Tigerstrom	Ph.D. (Br. Columbia)	1969 -
Michael A. Pickard	Ph.D. (Liverpool)	1970 -
Gerald W. Stemke	Ph.D. (Illinois)	1970 -

Kenneth L. Roy	Ph.D. (Br. Columbia)	1970 -
William J. Page	Ph.D. (Br. Columbia)	1976 -
Susan E. Jensen	Ph.D. (Alberta)	1981 -
Phillip M. Fedorak	Ph.D. (Alberta)	1985 -
Hosmin Anwar	Ph.D. (Astron)	1988 -
Laura S. Frost	Ph.D. (Alberta)	1990 -
Brenda K. Leskiw	Ph.D. (Alberta)	1991 -

Long Term Staff

Art McKinnon	1962 -
Mary Illes	1963 - 1981
Hedy Tebelmann	1964 - 1989
Maxine Coombs	1965 - 1974
Dale Shelmerdine	1970 -
Joan Hoppenbrouwers	1979 -

Appendix III

Successful Students

Ph.D.'s Conferred

Sheila A. Berry	1969
Charles R. Shobe	1970
Lawrence E. Bryan	1970
Kenneth G. Johnson	1971
Wendy M. Johnson	1971
Cecily Mills	1971
M. Shamsi Shahrabadi	1972
Jui-T'eng Tseng	1973
James A. Dangerfield	1974
Susan E. Jensen	1975
Jacques Boisvert	1976
Christian O. Obuekwe	1980
Irene T. Fecycz	1982
James L. Doran	1983
Julia M. Foght	1985
Wade H. Bingle	1987
Lai-King Ng	1987
James M. MacPherson	1988
Brenda K. Leskiw	1988
S. Karen Collinson	1989
Deborah J. Roberts	1990
Xiaoning Wu	1990
Shailaja Shivprasad	1991
Kalkuli Shankar	1991

May, 1970 - First four year B.Sc. (Specialization, Microbiology) conferred.

Joseph Sarzynick

Dora Oi Pik Yeung

May, 1971 - First B.Sc.(Honours Microbiology) conferred.

Wendy Elizabeth Parris

Krishna Ramlakhan

COVER DESIGN BY

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